UNITED STATES DISTRICT COURT
DISTRICT OF MINNESOTA

Digi International, Inc.,
a Delaware Corporation
authorized to do business in Minnesota,

Plaintiff,

v.

Lantronix, Inc.,
a Delaware Corporation,

Defendants;

and

Lantronix, Inc.,
a Delaware Corporation,

Counter-Claimant,

v.

Digi International, Inc.,
a Delaware Corporation
authorized to do business in Minnesota,

Counter-Defendant.

Civil No. 04-1560 (DWF/SRN)

MEMORANDUM
OPINION AND ORDER

Cortney G. Sylvester, Esq., David T. Schultz, Esq., and Stephen K. Warch, Esq., Halleland Lewis Nilan & Johnson PA, counsel for Plaintiff and Counter-Defendant.

Jan P. Weir, Esq., Jennifer A. Trusso, Esq., Peter N. Villar, Esq., and Steven M. Hanle, Esq., Stradling Yocca Carlson & Rauth; and Jeffrey J. Bouslog, Esq., and Andrew S. Hansen, Esq., Oppenheimer Wolff & Donnelly LLP, counsel for Defendant and Counter-Claimant.

Introduction

The above-entitled matter came before the undersigned United States District Judge on September 22, 2005, on the issue of patent claim construction pursuant to *Markman v. Westview Instruments, Inc*., 517 U.S. 370 (1996).

Background

This litigation involves a claim by Plaintiff Digi International, Inc. ("Digi"), that the Xport™ and the CoBox Micro (version 4.5) embedded device servers manufactured and sold by Defendant Lantronix, Inc. ("Lantronix") infringe the patent rights of U.S. Patent No. 6,446,192 B1 (the "'192 Patent").

The '192 Patent, entitled "Remote Monitoring and Control of Equipment Over Computer Networks Using a Single Web Interfacing Chip," was issued on September 3, 2002. ('192 Patent at 1.) Generally, the '192 Patent describes an apparatus that allows for a device or equipment to be monitored over a computer network from another location. (*Id*. at c: 1, ll: 8–12.)

The disputed claim language of the '192 Patent reads as follows:

> 1. A single self-contained and autonomous module for directly interfacing device control circuitry of a device to a client machine via a computer network, wherein the module[1] comprises:
>
> a device interface comprising circuit blocks for communicating digital information between the module[2] and the device control circuitry;
>
> a network interface comprising circuit blocks for communicating digital information between the integrated circuit and the computer network; and
>
> a non-volatile configuration memory for storing configuration data wherein the internal memory comprises instructions for implementing an API with the device;
>
> wherein the device interface, network interface, and memory are interconnected and perform operations for:

[1] The word "module" replaced the word "chip" via a certified correction dated September 3, 2002.

[2] The word "module" replaced the words "integrated circuit" via a certified correction dated September 3, 2002.

> implementing internet protocol functionality on the network;
> translating information between network protocol formats and a format of the device;
> transferring information between the network and the device control circuitry; and
> sending customized software to the client machine over the network, wherein the software is executable on the client machine, and wherein the software enables the client machine to generate device control signals and to receive device status information.

. . .

> 4. The module of claim 1 wherein the software comprises bytecode instructions executable by a bytecode interpreter running on the client machine, wherein the instructions are customized to characteristics of the device, and wherein the instructions generate on the client machine a virtual interface with the device.

('192 Patent c. 18, ll: 41–67; c. 19, ll: 6–11.)

Discussion

I. Claim Construction Principles

Patent claim construction, *i.e.*, the interpretation of the patent claims that define the scope of the patent, is a matter of law for the Court. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970–71 (Fed. Cir. 1995), *aff'd* 517 U.S. 370 (1999). Proper claim construction requires an examination of the intrinsic evidence of record, including the claims of the patent language, the specification, and the prosecution history. *Vitronics Corp. v. Conceptronic, Inc*., 90 F.3d 1576, 1582 (Fed. Cir. 1996). The terms used in the patent are presumed to carry "the meaning that the term would have to a person of ordinary skill in the art at the time of the invention." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc) (citation omitted). The specification is "the single best guide to the meaning of a disputed term." *Id*. at 1315. The specification may proscribe a special definition given to a claim term, or a disavowal of claim scope by the inventor. *Id*. at 1316. In such cases, the inventor's intention that is expressed in the specification is dispositive. *Id*. The court may use a dictionary or technical treatise to "assist in

understanding the commonly understood meaning" of a term, so long as any meaning found in such sources does not contradict the definition that is found in the patent documents. *Id*. at 1322–23. In addition, the court may not import limitations from the specification into the claims. *Id*. at 1323.

II. Claim Construction of the '192 Patent

The parties ask the Court to construe eight claim terms for the '192 Patent.[3]

A. Single Self-Contained and Autonomous

Digi proposes that "self-contained" means "providing all networking hardware, networking software, and device interface elements needed for networked operation of a device." Digi asserts that the term "autonomous" should be construed as follows: "the module operates independently of the device, does not incorporate any of its functionality or require any changes to the device, and can if necessary provide all processing power and the network communication capabilities required to enable networked operation of the device." Further, Digi adds, "No device specific applications run on the module." Lantronix, on the other hand, contends that the term "self-contained autonomous" "should be defined by the elements listed after the word 'comprises,' which define what the 'self-contained autonomous' module is 'comprised of.'" Lantronix asserts that the word "comprises" is "non-limiting and means that a device may be covered by the claim even if it has additional components or functionality." Finally, Lantronix maintains that "autonomous," as used in Claim 1, does not mean that the module is located outside the device.

As a preliminary matter, the Court disagrees with two crucial aspects of Lantronix's proposed construction. First, Lantronix asserts that the claim language to be construed is a single

[3] At oral argument on the matter, the parties agreed on the construction of five other terms that were previously in dispute.

phrase: "self-contained autonomous." Claim 1, however, uses the language "self-contained *and* autonomous." ('192 Patent c.18, l: 41 (emphasis added).) In light of the actual claim language, the Court will construe the terms "self-contained" and "autonomous" separately. To do otherwise would inappropriately render one of the terms meaningless. *See Cardiac Pacemakers, Inc. v. St. Jude Medical, Inc.*, 296 F.3d 1106, 1115 (Fed. Cir. 2002).

In addition, the Court finds no support for Lantronix's position that the phrase "self-contained and autonomous module," followed by the word "comprises," means that the "module" of Claim 1 merely contains the elements that are subsequently listed in Claim 1. The Court agrees with Lantronix that the word "comprises" acts as a transition, meaning that the claim language "is inclusive or open-ended and does not exclude additional, unrecited elements or method steps." *Georgia-Pacific Corp. v. United States Gypsum Co.*, 195 F.3d 1322, 1327 (Fed. Cir. 1999) (citations omitted). However, this transitional language does not render meaningless the terms that precede the word "comprises." In other words, Lantronix's proposed construction would inappropriately render the terms "self-contained" and "autonomous" as mere surplusage. The Court finds that Claim 1 describes a unit that "comprises" the subsequently listed elements, but is also "self-contained" and "autonomous." ('192 Patent c. 18, ll: 41–44.) With this determination in mind, the Court turns to the construction of the words "self-contained" and "autonomous."

1. Self-Contained

As noted above, Lantronix has not provided the Court with an independent proposed construction for the term "self-contained." Digi asserts that the term "self-contained" should be construed as "providing all networking hardware, networking software, and device interface

elements needed for networked operation of a device." The Court finds merit in Digi's construction.

The specification supports Digi's construction. The specification describes a module that provides all of the networking capabilities needed to operate or monitor a device from a remote location. The specification specifically states:

> the present invention requires only a single, inexpensive integrated circuit chip. Remarkably, this single network interface chip provides all the networking hardware, networking software and device interface elements necessary for network connectivity and web-based or network-based management of any device.

('192 Patent c.2, ll: 45-50.) Further, it describes the invention as follows:

> the network interface chip of the present invention provides complete internet enablement without any expensive web server machine. The chip alone is a fully functional internet node, including a web server, and supporting various protocols and hardware connections.

(*Id.* at c. 3, ll: 11–16.) Finally, the specification reads:

> The network interface chip 36 is a single integrated circuit that connects to the control circuitry 38 of virtually any remote device 34 and implements all networking services required to interface the device with a high performance computer network 32 for remote control and monitoring by one or more clients 30.

(*Id.* at c. 6, ll: 30–35.) This language supports a construction of "self-contained" as providing all of the hardware and software required to operate a device remotely.

In addition, the prosecution history supports Digi's construction. In their reply to the Office Action dated November 30, 2001, the inventors stated:

> The present invention clearly claims and describes in the specification (for example Page 3, lines 23–24; Page 4, lines 22–24; Page 5, lines 1–2) a **single module** (such as a network interface chip) that provides **all** the networking hardware, networking software, and device interface elements necessary for network connectivity and web-based or network-based management of any device.

(Reply to Office Action at 5–6 (emphasis in original).) This prosecution history is consistent with the specification and supports Digi's construction.

Thus, the Court construes the term "self-contained" to mean that the module "provides all networking hardware, networking software, and device interface elements needed for the networked operation of the device."

2. Autonomous

As stated above, Digi asserts that "autonomous" should be construed to mean "the module operates independently of the device, does not incorporate any of its functionality or require any changes to the device, and can if necessary provide all processing power and network communication capabilities required to enable networked operation of the device. No device specific applications run on the module." Aside from its arguments noted above, Lantronix offers no independent proposed construction of the term "autonomous." Lantronix disagrees with Digi's construction, however, and asserts that it inappropriately reads limitations into Claim 1.

Digi contends that the specification supports its construction. Specifically, Digi points to the following language:

> the present invention requires only a single, inexpensive integrated circuit chip. Remarkably, this single network interface chip provides all the networking hardware, networking software and device interface elements necessary for network connectivity and web-based or network-based management of any device.

(*id.* at c. 2, ll: 45-50);

> the network interface chip of the present invention provides complete internet enablement without any expensive web server machine. The chip alone is a fully functional internet node, including a web server, and supporting various protocols and hardware connections.

(*id.* at c. 3, ll: 11–16);

> The network interface chip 36 is a single integrated circuit that connects to the control circuitry 38 of virtually any remote device 34 and implements all networking services required to interface the device with a high performance computer network 32 for remote control and monitoring by one or more clients 30.

(*id.* at c. 6, ll: 30–36);

> The resulting interface to the Device Control Circuitry 38 is a simple, easy to use data exchange. The device 34 is not burdened with the overhead of network processing.

(*id.* at c. 6, ll: 41–44);

> The chip's complete Internet Protocol implementation offloads the complex network processing and real-time requirements from the device control circuitry.

(*id.* at c. 7, ll: 23–26); and

> As is evident from the description above, the chip 36 is entirely generic and capable of being customized to interface with any device using any of the various device interfaces described above, and with any client via any of the various network interfaces described above. Thus, this single chip can be inexpensively produced in large quantities for a wide variety of potential applications, and then easily customized for use in specific devices.

(*id.* at c. 16, ll: 23–30).

In addition, Digi asserts that the invention's patentability was initially rejected over prior art that disclosed modules that provided remote monitoring and control of devices but envisioned modification of the devices or running device-specific applications on the module. In reply to the Office Action, the inventors stated:

> Important is the partitioning and autonomy of the module wherein the module performs none of the application-specific functions of the host device. The module solely and completely provides the network connectivity function. The same module also enables monitoring and controlling of any device, regardless of its available processing power, code space, or interface pins. Even devices without a CPU or microcontroller are supported.

(Reply to Office Action at 6.)

The Court agrees, in part, with Digi's proposed construction. The Court finds that the specification points to the universal applicability or generic nature of the module, and thus that the module operates independently of the device. In addition, in light of the generic, universally-applicable nature of the module, the Court finds that the specification and prosecution history support that the module does not incorporate any of the device's functionality. If the module were to take over some of the device's functions itself, the module would, in effect, become part of the device control circuitry and not be autonomous. Here, rather, the module simply acts as a conduit between the virtual interface controls of the client machine and the device itself.

The Court finds that Digi's proposed construction goes too far in some respects as well. First, the Court finds no support for Digi's contention that the module "does not require any changes to the device." The Court can contemplate ways in which the universally-applicable module described in the claim language and specification would require a change to the device. For instance, in the hypothetical example often used by Digi in this litigation, the module acts as a link between a host computer and a thermostat via a computer network. Digi's construction does not account for the change that would be required to the thermostat to allow the module to physically connect to the thermostat's circuitry. The Court sees this same issue arising with any device that does not have built-in connection ports. In this sense, the module would require a change to the device in order to allow it to connect to the device. Neither the claim language nor the specification disavows this interpretation.

Digi also asserts that the module can, if necessary, provide all processing power and network communication capabilities required to enable networked operation of the device. The Court agrees that this may be true of the invention based on the specification and prosecution history. But the Court sees no need to incorporate these aspects into the construction of the term

"autonomous" because the Court has already construed the term "self-contained" to encompass these elements. Thus, to attach these same definitions to the term "autonomous" would render one of the terms redundant.

Finally, Digi asserts that no device-specific applications run on the module. The Court finds no support in the claim language or specification for this construction. Moreover, the Court finds that the language of the prosecution history (or the inventor testimony) is not sufficient to impart this construction into the definition of the term "autonomous." Specifically, Digi cites to language from the inventors' reply to the Office Action that states that the module "performs none of the application-specific functions of the host device." (Reply to Office Action at 6.) But this language does not equate to "no device-specific applications running on the module," as Digi contends. Because the claim language and prosecution history contain no clear disavowal of device-specific applications running on the module, this portion of Digi's proposed construction is inappropriate.

With these considerations in mind, the Court defines the term "autonomous" as "the module operates independently of the host device and does not incorporate any of the device's functionality."

B. Directly

The term "directly" appears in Claim 1 of the '192 Patent. Digi maintains that "directly" should be defined as "providing the only link between the device control circuitry and the client machine, requiring no intermediate devices or application-specific processing. In other words, allowing the client machine to interface with the device control circuitry of the device without any additional intermediating device or entity." Lantronix, on the other hand, contends that

"directly interfacing" should be construed as "the module can interface the device's control circuitry to a computer network without the need of additional hardware components."

The term "directly" was added to the preamble of Claim 1 during the prosecution of the '192 Patent along with the following explanation:

> Claim 1 is amended, without prejudice and without adding new matter, to more specifically point out the scope of the invention of the present application. "Directly" has been added to the preamble to more specifically point out the fact that the module directly interfaces (without intermediate devices) the device control circuitry of a device and a client machine.

(Reply to Office Action at 7.) In addition, in an attempt to distinguish prior art, the Reply to Office Action stated:

> In the present application the single module is the **only** link between a remote device and the Internet. In addition, the module of the present application is also the **only and direct interface** between device control circuitry of a device and a client machine with its **own programming interface** through an API.

(*Id.* at 6 (emphasis in original).)

The specification states:

> Because this single chip is the only link between the remote device and the Internet, it provides an extremely simple and inexpensive solution to remote monitoring and control. The simplicity of this direct interface has the additionally important benefit that the number of possible points of failure between the device and the network is minimized. Prior art solutions, in contrast, typically have multiple intermediary devices, such as gateway servers in combination with device hardware.

('192 Patent at c. 3, ll: 21–29.) Moreover, the specification states:

> the architecture of the present invention links the remote device/equipment 34 to the high performance network 32 without any expensive intermediary server machine.

(*Id.* at c. 5, ll: 1–4.)

The Court agrees that this language supports a definition of "directly" to mean that the module provides the only link between the device control circuitry and the client machine

without the need of additional intermediate devices. Consistent with the Court's discussion of Digi's proposed construction of the term "autonomous," the Court finds no support for Digi's assertion that the module requires no application-specific processing. As a result, the Court construes the term "directly" as "the module interfaces or links the device control circuitry of a device to a client machine without the need of intermediate devices."

C. Device Control Circuitry

The term "device control circuitry" appears in Claim 1 of the '192 Patent. Digi contends that "device control circuitry" should be construed as "the mechanism within the device that controls it, for example, by implementing the device's main functionality, or by causing the device to deliver data, take defined actions, or otherwise respond to command signals." Lantronix asserts that this term should be given its plain meaning, "circuitry that controls the device."

The Court agrees with Lantronix's contention that the words "circuitry" and "mechanism" (in Digi's proposed construction) are not synonymous. The claim language and specification do not support such a construction. Moreover, the Court agrees with Lantronix that the meaning of this term is obvious and requires very little construction. Thus, the Court construes "device control circuitry" to mean "circuitry that controls the device."

D. Non-Volatile Configuration Memory

The module of Claim 1 includes "a non-volatile configuration memory," the meaning of which is in dispute. Digi asserts that "non-volatile configuration memory" should be construed as "data storage (either internal or external to the module) for configuration data which persists after the module is powered down." Lantronix maintains that this term should be construed as "a computer memory device, located within the module, that does not lose its memory when power

to the memory is turned off. Claim 1 requires that such a memory contain configuration information and instructions for implementing an API specific to the device." The parties agree that a non-volatile memory is one that retains its stored data after power is shut down. The dispute arises over whether the data storage needs to take place within the module, or if it may exist outside the module.

In support of its proposition that the non-volatile configuration memory can be located either internal or external to the module, Digi cites to language in the patent specification that describes different embodiments of the patent. Specifically, Digi points to the following language:

> A configuration memory 86 on the chip provides a flash or other non-volatile memory which may be programmed by the user with configuration data, byte code data, and other information specific to a particular application or device. Alternatively, an EEPROM interface 88 allows this data to be stored on an external non-volatile device, such as an EEPROM.

(*Id.* at c. 16, ll: 15–22.)

> For example, the same chip is used in a small digital camera as is used in a large industrial machine, the only difference being the specific data and/or instructions stored in the configuration memory 86 and/or in an external EEPROM. For example, the configuration memory 86 and/or the external EEPROM might store an application specific applet customized for the device.

(*Id.* at c. 16, ll: 30–36.)

> In the case of automatic configuration, the chip is initialized using configuration data stored in an internal configuration memory and/or in an external memory (e.g., EEPROM) connected directly to the network interface chip.

(*Id.* at c. 16, ll: 59–63.)

Lantronix, on the other hand, asserts that the alternative, EEPROM embodiment is not supported by the claim language. Specifically, Lantronix points to the language of Claim 1, which claims a "single self-contained and autonomous module . . . wherein the module

comprises . . . a non-volatile configuration memory." (*Id.* at c. 18, ll: 41–53.) Lantronix contends that in order for the module to be "self-contained," the memory must be on or within the module.

The Court agrees, in part, with Lantronix's construction. The Court finds that the claim language requires that the memory be either on or within the confines of the module. In order to give full meaning to the terms "self-contained," "wherein," and "comprises," and to remain consistent with the Court's construction of the term "self-contained," the Court must read Claim 1 to require memory that is contained within the confines of the module.

The Court does not agree with Lantronix, however, that the EEPROM embodiment is inconsistent with the language of Claim 1. The specification describes two alternate embodiments of the patent, one with internal memory and another with EEPROM memory that is "connected directly to the network interface chip." ('192 Patent at c. 16, ll: 59–63.) This is not inconsistent with the requirement that the module, including its non-volatile configuration memory, be self-contained. In the manner described in the EEPROM embodiment, the main network interface chip has the EEPROM directly attached to it. This EEPROM is still inside the same physical confines of the module and thus still consistent with the language of Claim 1.

With these considerations in mind, the Court construes "non-volatile configuration memory" to mean "data or memory storage, located within the module, that persists when the module is powered down."

E. Customized Software

Claim 1 provides that the device interface, network interface, and memory perform operations for "sending customized software to the client machine over the network." Digi contends that this term should be construed as "executable software, delivered to and running on

the client machine, which provides device-appropriate user interface and control operations." Lantronix, on the other hand, asserts that this term should be defined as "software specific to the device that allows for the generation of device control signals and reception of device status information. By way of example only, Java applets or HTML-based control software."

The parties have clarified their positions, and it appears that the main dispute is whether the software provides "device-specific" user interface and controls, or "device-appropriate" user interface and controls. Digi argues that the term "device-appropriate" is more suitable here, as this broader term encompasses an interface that could potentially be tailored to work on more than one device. The Court agrees with Digi's construction. The claim language and specification do not limit the user interface to merely one specific device. For instance, a single interface may be suitable for use with more than one brand of copier or with more than one brand of digital camera. For this reason, the Court construes "customized software" to mean "executable software, delivered to and running on the client machine, which provides device-appropriate user interface and control operations."

F. Generate Device Control Signals

Claim 1 provides that the device interface, network interface, and memory perform operations for sending customized software to the client machine over the network, and that such software "enables the client machine to generate device control signals . . . ." (*Id.* at c. 18, ll: 63–67.)

Digi asserts that this term should be defined as "to create digital data that comprise instructions for manipulating the device control circuitry." Lantronix contends that this term needs no construction beyond its plain meaning. The Court agrees that the phrase "generate device control signals" needs very little construction. The Court finds that the plain meaning of

the term to a person of ordinary skill in the art would be that the software enables the client machine "to generate signals that control the device."

G. Customized to Characteristics of the Device

Claim 4 is a dependent claim related to the module of Claim 1. Claim 4 describes software in the module that is comprised of bytecode instructions that are "customized to characteristics of the device."

Digi maintains that "customized to characteristics of the device" should be defined as "the [bytecode] instructions are customized to characteristics of the device: the applet or similar program is designed to display on the client machine a virtual interface that has the appropriate appearance and offers the proper control options for the device." Lantronix contends that this term should be given its plain meaning, which Lantronix contends is "instructions that are specifically customized to the characteristics of the device. By way of example only, a Java applet or HTML page."

The Court agrees with Lantronix that this term needs little construction, as its plain meaning is clear. However, the Court also sees no support for including the specific examples that Lantronix describes—a Java applet or HTML page—into the claim construction of this term. Thus, the Court construes "customized to characteristics of the device" to mean that "the bytecode instructions are specifically customized or tailored to the characteristics of the device."

H. Virtual Interface with the Device

Claim 4 further describes the bytecode instructions in the module's software that "generate on the client machine a virtual interface with the device." Digi asserts that "virtual interface with the device" should be defined as a "graphical user display running on the client machine that provides control options for the device and that allows the client machine to

generate device control signals to be transmitted to the device control circuitry via the module." Lantronix, on the other hand, contends that the Court should construe this term as an "on-screen virtual image generated by software from the module of a control interface specific to a device."

The patent specification describes a virtual display that allows the user to monitor or control the device from a client machine. The patent specification states that "[t]he user interface or virtual control panel displayed on the browser may be an HTML page, or a Java applet. In either case, graphics, buttons, indicators, etc., may be used to simulate the equipment's control panel or actual appearance." ('192 Patent c. 5, ll: 35–39.) The specification also describes, in the Java-based control method, a "virtual control panel" Java applet that is "created to provide the user of the client to remotely monitor and/or control the remote equipment." (*Id*. at c. 8, ll: 66–67 - c. 9, ll: 1–2.) In addition, this method describes the "activation of buttons and controls on the panel" that are "translated into commands by the applet and transmitted to the network interface chip." (*Id*. at c. 9, ll: 13–16.)

The Court finds that the claim language and the specification do not limit the construction of "virtual interface with the device" in the manner that Digi proposes, nor does it broaden the language in the manner that Lantronix proposes. First, neither the claim language nor the specification limits the construction of the virtual interface to a "graphical" display. In fact, the specification lists "graphics" as one of several examples of the way the virtual control panel can simulate the device's control panel. (*Id*. at c. 5, ll: 35–39.) Digi's proposed construction is too narrow in this regard. In addition, although the specification does not specifically delineate "control options" or "control signals," the specification does provide that the virtual interface is a control panel that generates commands that are sent to the device. (*Id*. at c. 8, ll: 66–68 - c.9, ll: 1–2; c. 9, ll: 13–16.)

Consistent with the claim language and the specification, the Court construes "virtual interface with the device" to mean "a virtual display that allows the user of the client machine to send commands from the client machine to the device control circuitry via the module."

Conclusion

For the reasons stated, **IT IS HEREBY ORDERED** that the '192 Patent is construed as set forth in this Order.

Dated: November 28, 2005

s/Donovan W. Frank
DONOVAN W. FRANK
Judge of United States District Court